A33E-0274: Supporting Regional Climate Variability Prediction through NCAR's NRCM Data Portal

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http://rda.ucar.edu/datasets/ds601.0

Introduction

The current ability to assess extreme weather events and their impacts is limited by not only the rarity of the event, but also by current model fidelity and a lack of understanding and capacity to model the underlying processes. The Nested Regional Climate Model (NRCM), developed by the Regional Climate Research team at the National Center for Atmospheric Research (NCAR), is a dynamical downscaling tool based on NCAR's Weather Research and Forecasting (WRF) model which addresses this challenge (Done et al. 2013). The NRCM combines the strengths of the WRF model and NCAR's Community Climate System Model (CCSM) into an instrument that will allow for fundamental progress on the understanding and prediction of regional climate variability and change. In particular, embedding WRF within CCSM will allow scientists to resolve processes that occur at the regional scale, as well as the influence of those processes on the large-scale climate, thereby improving the fidelity of climate change simulations and their utility for local and regional planning. Global climate data from the CCSM are used to drive a NRCM 36 km domain using one-way nesting, which in turn is used to drive a 12 km domain nested inside the 36 km domain.

The Research Data Archive (RDA) at NCAR provides data collection and access services for the NRCM output on the 36 km domain. The output fields in this dataset consist of two- and three-dimensional arrays at three- and six-hourly intervals. A basic set of 3-D parameters is provided on model pressure levels: relative humidity, temperature, wind components, geopotential height, and potential vorticity. Additional 2-D parameters are provided at the model surface or near-surface level, and potential vorticity arrays are also provided on the 320 K and 345 K isentropic surfaces. Data are available as monthly time series files in NetCDF. The data currently provided are from the climate runs with regional model domain over the North Atlantic Ocean and USA. The simulation covers three periods: a decade of 'current' climate conditions (1995-2005), and two future decades of 2020-2030 and 2045-2055 (data availability forthcoming).

Reference: *Done, J.M., G.J. Holland, C.L. Bruyère, L.R. Leung, A. Suzuki-Parker, 2013: Modeling high-impact weather and climate: Lessons from a tropical cyclone perspective. Climatic Change, DOI: 10.1007/s10584-013-0954-6.*

User Support Services

The RDA consulting team consists of specialists with science and engineering educational backgrounds, and applied experience in research. Each consultant focuses on a specific range of datasets and provides direct user support for those datasets, including the NRCM dataset (Thomas Cram, tcram@ucar.edu). Examples of this support includes preparation of one-off user requests, assistance with supporting software, data quality and format questions, and help in getting data transferred to the end user through the most convenient method, including hard media.

To inform users of new services and updates, the RDA publishes updates through a news page on its web interface, an RSS feed, a Twitter feed (NCAR_RDA), and a Facebook page (NCAR-CISL-Research-Data-Archive).

For general help, please contact dssweb@ucar.edu or see http://rda.ucar.edu/#FAQs

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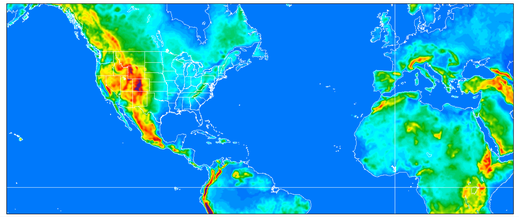
NCAR NRCM Data Holdings

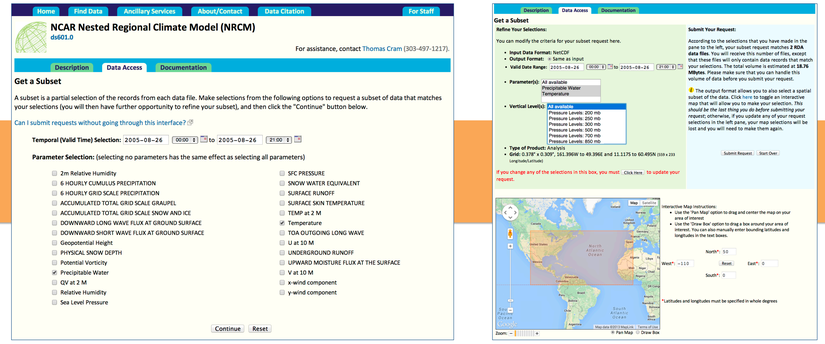
Model Domain (36 km grid resolution at 31 N)

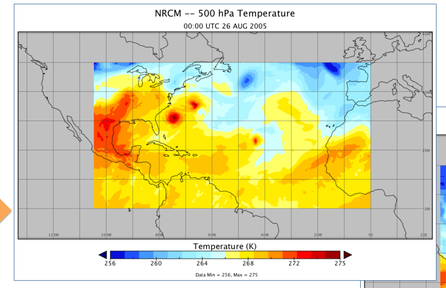


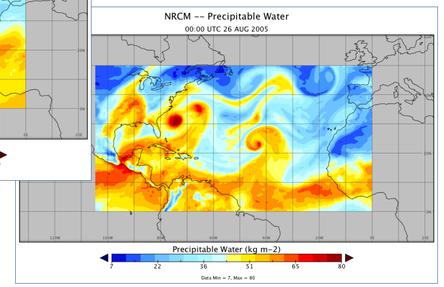
Parameters	Levels
Geopotential Height	8 Pressure Levels
Relative Humidity	8 Pressure Levels, 2-meter Level
X- and Y-Wind Components	8 Pressure Levels, 10-meter Level
Potential Vorticity	8 Pressure Levels, 2 Isentropic Levels
Temperature	8 Pressure Levels, 2-meter Level
Surface Skin Temperature	Surface
Surface and Sea Level Pressure	Surface
Downward Longwave and Shortwave Flux	Surface
Outgoing Longwave Radiation	TOA
Water Vapor Mixing Ratio	2-meter Level
Upward Moisture Flux	Surface
Precipitable Water	Surface
Accumulated Cumulus and Grid Scale Precipitation	Surface
Accumulated Grid Scale Graupel, Snow and Ice	Surface
Snow Water Equivalent	Surface
Physical Snow Depth	Surface
Surface Runoff	Surface
Underground Runoff	Single Level
Soil Moisture	4 Soil Layers

Data Access Workflows

Temporal Range, Parameter, and Spatial Area Data Sub-sets







Monthly Three- or Six-Hourly Structured Data Files